



The effect of production type and antimicrobial usage on the occurrence of tetracycline resistant *E. coli* in danish slaughter pig farms

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The effect of production type and antimicrobial usage on the occurrence of Tetracycline resistant *E. coli* in Danish slaughter pig farms.

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The Qualysafe project was initiated in 2007 to support and strengthen the sustainable production systems in Danish food production. One of the objectives of the epidemiological investigation was to find new methods to improve food safety in conventional as well as in alternative pig production systems. At nine different slaughterhouses 1500 caecum samples were collected from slaughter pigs originating from 226 farms. One thousand samples were analyzed and one *E. coli* isolate per sample was susceptibility tested to Tetracycline. Data on management practice and health status at farm level was collected through telephone interviews. Data on antimicrobial consumption at farm level was collected from the Danish surveillance program VetStat. In total, 99 farms used Tetracycline and participated in the interview and from these farms, 411 isolates were available. We assumed that production type (organic, free range and conventional farms) was a risk factor for occurrence of antimicrobial resistance and Tetracycline usage was regarded as an intervening factor between production type and occurrence of antimicrobial resistance. Therefore, the effect of production type and Tetracycline usage was estimated in two separate models using logistic regression, taking into account the correlation of results obtained from the same farm. Among the 411 isolates, 129 was found resistant to Tetracycline (Organic: 10%, Free Range: 27 % Conventional: 39 %). Differences were seen in the consumption pattern among the farm types, with the Organic having the lowest consumption (0.14 doses /annually produced slaughter pig) while Free Range had the highest consumption (0.85 doses/annually produced slaughter pig) and Conventional farms was in between (0.67 doses/annually produced slaughter pig). The effect of Tetracycline usage was estimated using a quadratic polynomial. This showed a significant effect of Tetracycline consumption on the occurrence of Tetracycline resistance, where the occurrence of resistance increased by increased antimicrobial usage. Production type had significant effect on the occurrence of antimicrobial resistance, with the lowest occurrence in Organic production and the highest in Conventional production. When analyzing the effect of production type and usage of antimicrobials on occurrence of resistance in the same model, the usage of antimicrobials was not found to have an effect. This lack of effect can be explained by the fact that Tetracycline, at least partly, is an intervening factor between production type and the consumption. The results from our analysis showed the importance of correctly classifying different risk factors as causal and intervening factors before analyzing the effect of potential risk factors on the occurrence of antimicrobial resistance in animal production.

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